## REMARKS/ARGUMENTS

The claims are 1-3 and 6-11. Independent method claim 1 has been amended to incorporate the subject matter of method claim 4 and subject matter previously recited in device claim 5 and has been amended to improve its form. Claim 4 has accordingly been canceled. Claims 2-3 have been amended to correspond to the amendments to claim 1. New claim 11 directed to a synthesis reactor has been added containing the subject matter of device claim 5 and subject matter previously recited in method claim 4. Device claim 5 has accordingly been canceled. Claims 6-10 have been amended to improve their form, to depend on new claim 11 instead of claim 5, and to further correspond to new claim 11. The specification has also been amended to improve its form. Support for the amendments to the claims may be found, *inter alia*, in the original claims, in the second-to-last full paragraph on page 2 of the specification, and in the second full paragraph on page 4 of the specification. Reconsideration is expressly requested.

Claims 1-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Vanderborgh U.S. Patent Application Publication No. 2002/0098136*. Essentially the Examiner's position was (1)

that *Vanderborgh* discloses the claimed method for nozzle-jetting oxygen and the claimed device for nozzle-jetting oxygen, except for the method being performed as part of an oxy-dehydration process, and (2) that it would have been obvious to use the process of *Vanderborgh* in any process requiring oxygen including an oxy-dehydration process as in claim 1.

The Examiner responded to Applicants' argument in the February 12, 2010 Amendment in Response to First Office Action, that *Vanderborgh* fails to disclose Applicants' claimed method and device in which oxygen is jetted onto the catalyst surface because *Vanderborgh* does not exclude a tangential inflow as shown in FIG. 2 of *Vanderborgh* which means that even the walls of *Vanderborgh* are used for flow guidance, by taking the position that this argument goes against Applicants' invention because Applicants' claim 2 recited that jetting of the oxygen is taken up in a tangential alignment.

This rejection is respectfully traversed.

As set forth in amended claim 1, Applicants' invention provides a method for nozzle-jetting oxygen into a synthesis reactor for oxy-dehydration for largely axial flow of the gas mixture through a catalyst bed. The oxygen is fed to a ring distributor system having a plurality of concentric ring pipes provided with respective exit openings and arranged above the catalyst bed. The oxygen is fed in pure form, as air mixed with inert gas, or in water vapor, and is jetted on to the catalyst surface through the exit openings in the ring distributor at an inclined angle from the vertical. The oxygen is jetted in a plane about 50-300 mm above the catalyst bed to ensure an oxygen dwelling time of ≤ 1 second in a space above the catalyst bed.

As discussed at page 2 of Applicants' disclosure, it is imperative to prevent an irregular through-mixing of the jetted-in oxygen with the gas that streams into the catalyst. Thus, the path of the jetted-in gas from the entrance into the synthesis gas until the impact on the catalyst surface must be as short as possible in order, for example, to prevent a premature conversion of the propane into propylene because a too long presence of $O_2$ undesirably results in at least partial combustion of the propylene, which substantially reduces propylene yield. The

through-mixing period must therefore be extremely short in order for the gas and oxygen to be fed into the catalyst as a mixture.

Nevertheless, rather than feeding the oxygen vertically onto the catalyst surface (which would be the shortest time), Applicants' method as recited in amended claim 1 jets the oxygen onto the catalyst surface at an angle inclined from the vertical.

If the oxygen were to be fed vertically onto the catalyst surface, a part of the oxygen would rebound from the surface, which would lead to a long dwelling time of the oxygen above the catalyst bed which is undesirable.

*Vanderborgh* discloses a process where the gas mixture with the injected oxygen meets the catalyst surface as a parallel overcurrent (see paragraph [0010] of *Vanderborgh* - "catalyst applied as a layer formed on the **lower** surface of porous media **4**"). Therefore, with *Vanderborgh's* method, a long dwelling time of the oxygen results, and the benefits of Applicants' claimed method and synthesis reactor cannot be achieved.

It is respectfully submitted that *Vanderborgh* fails to disclose and fails to suggest Applicants' method as recited in amended claim 1, including each of the steps of jetting oxygen on to a catalyst surface through exit openings of a ring distributor, feeding oxygen to a ring distributor system having a plurality of concentric ring pipes, and jetting the oxygen in a plane about 50-300 mm above the catalyst bed to ensure an oxygen dwelling time of ≤ 1 second in a space above the catalyst bed.

Instead of disclosing that oxygen is jetted onto a catalyst surface, *Vanderborgh* discloses that oxygen is jetted horizontally and perpendicularly to the flowpath of the synthesis gas of the reactor. *Vanderborgh* discloses two different ways of jetting oxygen into the reactor stream, which two ways are illustrated in FIGURE 2 of *Vanderborgh* and which occur in the middle-most region of the injection component shown in FIGURE 1 of *Vanderborgh* at flow distribution matrix 5, between sections of porous material 3 and 4. See FIGURE 1 and paragraph [0010] on page 1 of *Vanderborgh*. Neither of these ways of *Vanderborgh* of jetting-in oxygen, however, includes jetting the oxygen with axial momentum so that the oxygen is **jetted onto** a catalyst surface. The oxygen injection strategy shown to the left of FIGURE 2 of *Vanderborgh*

jets oxygen in exclusively radial directions. The oxygen injection strategy shown to the right of FIGURE 2 of *Vanderborgh* jets oxygen in both radial and circumferential directions, but not in the axial direction. See FIGURE 2 and paragraphs [0018] and [0019] of *Vanderborgh*. The oxygen injected into the reactor of *Vanderborgh* moves in an axial direction to contact the catalyst only on the basis of the axial momentum of the process inlet feed. See FIGURE 1 of *Vanderborgh*.

Accordingly, with either method disclosed in *Vanderborgh* of jetting the oxygen, the oxygen will have an undesirable longer dwelling time in the process inlet feed before contacting the catalyst surface, so that the achievement of optimum product amounts in the oxy-dehydration process is hindered.

*Vanderborgh* also fails to disclose and fails to suggest jetting oxygen from concentric pipe rings, each with exit openings. Rather, *Vanderborgh* discloses that oxygen enters the process stream at a certain axial location, along the process stream, through one single pipe ring with a series of holes. *Vanderborgh* discloses that the oxygen would enter the process stream at the single pipe ring shown to the left of FIGURE 2 of

*Vanderborgh* or at the single pipe ring shown to the right of FIGURE 2 of *Vanderborgh*. The two pipe rings shown in FIGURE 2 of *Vanderborgh* are not meant to be used together but are meant to be used alternatively and therefore clearly are not concentric to each other.

*Vanderborgh* also fails to disclose and fails to suggest jetting the oxygen in a plane about 50-300 mm above the catalyst bed to ensure an oxygen dwelling time of ≤ 1 second in a space above the catalyst bed. *Vanderborgh* fails to specifically recite any distance of a plane above a catalyst bed, with oxygen being jetted-in in the plane. *Vanderborgh* also fails to disclose any specific oxygen dwelling time for the injected oxygen before it reaches the catalyst bed.

Accordingly, it is respectfully submitted that Applicans' method as recited in amended claim 1, together with amended method claims 2-3, which depend thereon, are patentable over *Vanderborgh*.

Applicants' amended claim 3 depends on amended claim 1 and further specifies that the jetting of oxygen takes place in tangential alignment and for each concentric ring pipe of the ring distributor in alternating alignment from concentric ring pipe to concentric ring pipe of the ring distributor.

It is respectfully submitted that *Vanderborgh* fails to disclose and fails to suggest Applicants' method as recited in amended claim 3 because *Vanderborgh* fails to disclose any concentric ring pipes that each jet in oxygen (and discloses injecting oxygen at a specified axial location with one single ring), and therefore fails to disclose jetting of oxygen in alternating alignment from concentric ring pipe to concentric ring pipe of the ring distributor.

Accordingly, it is respectfully submitted that Applicants' method as recited in amended claim 3 is patentable over *Vanderborgh* for this additional reason.

As set forth in new claim 11, Applicants' invention provides a synthesis reactor for oxy-dehydration including a catalyst bed and a device for nozzle-jetting oxygen onto the catalyst bed.

The device for nozzle-jetting oxygen onto the catalyst bed includes a ring distributor having a plurality of concentric ring pipes provided with respective exit openings above the catalyst bed. A largely axial flow of gas mixture through the catalyst bed occurs. The exit openings are designed to jet the oxygen onto a catalyst surface of the catalyst bed at an angle inclined away from the vertical. The ring distributor is positioned in a plane about 50-300 mm above the catalyst bed to ensure an oxygen dwelling time of $\leq$ 1 second in a space above the catalyst bed.

It is respectfully submitted that Applicants' synthesis reactor as recited in new claim 11, which is used to perform Applicants' method as recited in amended claim 1, is patentable over *Vanderborgh* for those reasons described above that amended claim 1 is patentable over *Vanderborgh*. Amended claims 6-10, directed to synthesis reactors, depend on new claim 11 and are therefore patentable over *Vanderborgh* for these same reasons.

Applicants' amended claim 9 depends on new claim 11 and further specifies that the exit openings are aligned in alternating sequence to adjacent exit openings of the exit openings of an adjacent ring pipe of the plurality of concentric ring pipes.

Accordingly, it is respectfully submitted that *Vanderborgh* fails to disclose and fails to suggest Applicants' synthesis reactor as recited in amended claim 9 for those additional reasons described above that amended claim 3 is patentable over *Vanderborgh*.

In summary, claims 1-3 and 6-10 have been amended, claim 11 has been added, and claims 4-5 have been canceled. The specification has also been amended. In view of the foregoing, it is respectfully requested that the claims be allowed and that this application be passed to issue.

Respectfully submitted,
Johannes KOWOLL ET AL

COLLARD & ROE, P.C.
1077 Northern Boulevard
Roslyn, New York 11576
(516) 365-9802

Frederick J. Dorchak, Reg. No.29,298
Caleb D. Wilkes, Reg. No.60,873
Attorneys for Applicants

FJD:cdw

**EXPRESS MAIL NO. EM 145 117 585 US**
**Date of Deposit: July 27, 2010**

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10, on the date indicated above, and is addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Kelly Espitia

R:\Patents\K\KOWOLL ET AL-2 PCT\RCE\Preliminary Amendment in RCE.wpd